

## **ABSTRACT**

A bipolar plate for an electrochemical cell having a first layer, a second layer, and a third layer is disclosed. The first layer has a first plurality of through channels oriented in a first direction. The second layer has a second plurality of through channels oriented in a second different direction. The third layer is disposed between and bonded to the first and second layers. The third layer has a first set of header channels in fluid communication with the first plurality of channels, and a second set of header channels in fluid communication with the second plurality of channels. A first inlet port and a first outlet port are in fluid communication with the first set of header channels, and a second inlet port and a second outlet port are in fluid communication with the second set of header channels. The bonded third layer prevents fluid communication between the first plurality of channels and the second plurality of channels.